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THE EARTH

AS A

Cosmical System

USED AS

A Means of Measuring or Estimating Man's Relative Importance in the Scale of Being.

BY

ROBERT CURRY, A.M., Ph.D.,

Professor in the Nebraska State Normal School.

BEING

A BACCALAUREATE ADDRESS

DELIVERED BEFORE THE

GRADUATING CLASS AT PERU, NEB.,

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"All are but parts of one stupendous whole
Whose body nature is and God the soul."

—Pope.

THE

EARTH AS A COSMICAL SYSTEM.

If, in the light of modern science, we examine Nature, we find order, harmony, and system everywhere prevail; and in every part unmistakable evidence of a Great First Cause. So that the sentiment of Pope, that

> "All are but parts of one stupendous whole,
> Whose body Nature is and God the soul,"

although not regarded as very good theology nowadays, because when taken literally it savors of Pantheism, is nevertheless true, at least figuratively, in more respects than one; for if we examine nature in all her manifold and pleasing forms, and witness the organic relation of all her parts, constituting, as they do, one complete system, and then contemplate the evident marks of design and the wisdom and the power and the goodness manifested therein, we cannot but be im-

pressed with a belief in the existence of a God who animates and perpetuates the whole, the withdrawal of whose presence would cause all life to cease and leave nature as a corpse to a speedy dissolution, thus showing a relation to exist between God and nature at least somewhat analogous to that between soul and body.

To the superficial observer the visible parts of creation appear fragmentary, and the methods of perpetuating and governing even this world seem to be more the results of chance than the realization of a previous conception; but to the man of science and reflection there is abundant evidence that not only this world, but all the other worlds of which we have any knowledge are, in the mind and plan of the Creator, but parts of one great system to which we apply the name universe, a term which literally signifies turned into one, and implies not merely an aggregation of parts or collection of objects, but their harmonious arrangement into one system subject to one Supreme control.

Now, since all things are thus organically related, and since we can understand the individual parts of any organic system only in so far as we can comprehend them in their relations to that system, it follows that, in order to a full appreciation of anything, we must be able to comprehend it in its relations to all things thus taken organically. Hence, in order that we may be able to form an adequate estimate of man's relative importance in the scale of being, we must first gain a bird's-eye view of the universe of which he forms but an insignificant part. And it is for the purpose of obtaining such a view that in imagination we are now about to enter upon a half hour's exploring expedition through the universe, believing that by thus widening our mental horizon we shall be the better prepared to appreciate man's relative importance in the scale of being.

This is a subject whose consideration has received but little attention, man's superiority over the rest of creation hav-

ing been generally assumed without investigation. And, doubtless, by many its discussion now would be regarded as practically useless.

But surely some knowledge of man's relative importance in the scale of being is not only desirable in itself but lies at the very threshold of all human improvement; for while a man believes that he is not only the principal creature in the universe but that everything else in it was made for his special accommodation, he has such an inadequate conception of the vastness of creation and of his own relative insignificance that it is impossible for him to make any real progress.

It is observed by persons who have traveled much, that people who remain all their lives in the same neighborhood in which they were born, without having access to books or any communication with the outer world, usually grow up in so much ignorance, prejudice, and self-conceit that they are not only oblivious to

what is going on in the world around them but impenetrable to all its better influences. Such people are generally bigoted and narrow-minded, and of necessity measure everything, whether it be of a social, political, or religious nature, in the units of their own petty neighborhood. But, when such a community is brought into communication with the outer world, by means of its railroads, telegraphs, and literature, a marked change takes place. When thus exposed to the current of human progress and brought into sympathy with its influence, the citizens of such a community become more liberal-minded and tolerant of the opinions of others; their ignorance, prejudice, and self-conceit give place to intelligence and a love for truth; and, being thus animated by nobler impulses, broader views, and higher aspirations, they rise to a higher plane in the scale of humanity.

But it has seemed to me that what is thus true of the people of an isolated community in comparison with those of

the rest of the world, is pre-eminently true of the chief inhabitants of the earth as compared with those of the rest of the universe, so long as all their thoughts and aspirations are restricted to terrestrial bounds. Indeed, the very nature of their environment, while thus circumscribed, has a tendency to foster their native arrogance and self-conceit; for being the highest order of creatures on the earth, they are continually flattered by a comparison of themselves with beings of inferior orders, without ever coming into comparison with those of a superior order, till by and by they come to believe that they are the very lords of creation. But could man, as the chief inhabitant of the earth, be brought into direct communication with the rest of the universe, and thus enabled to compare himself with its chief intelligences, he would doubtless soon find occasion to modify his estimate of his own relative importance, and perhaps be thus enabled to live thereafter more in harmony with his surroundings.

It may be here objected, however, that we have no direct means of knowing that other worlds are inhabited by intelligent beings. And this is true, if by direct means is meant original, direct, or immediate knowledge. But it must be remembered that man has been endowed with reason, inventive genius, and ability to interpret manifestations of design, as recorded in the book of nature; that knowledge gained by these means is quite as natural, as reliable, and as obligatory upon human beings as that derived from sense-perception or any other source; and that, in the free exercise of all these powers, guided by a knowledge of universal science and aided by the use of all kinds of astronomical instruments, men of the greatest ability and most profound research have been led to the deliberate conclusion that, in accordance with the original plan, all the worlds that people space are designed to become, in some period of their existence, the abodes of intelligent beings. Of course it is not

claimed that all of them are so peopled at the same time, or any one of them at all times, but each in its turn. For example: our earth, since emerging from its chaotic condition, has passed through many stages of progress, each successive step being marked by a higher order of phenomena peculiar to itself, as physical, chemical, vital, and so on, till at length it has culminated in its present profusion of life, with man at its head. The moon has already run her vital course, and ceased to be an abode of living beings; while Jupiter has not yet arrived at the condition of habitability; and when with the aid of the spectroscope we examine the heavens, we find other worlds in analogous stages of progress. And thus it is that science teaches us that every star and planet and satellite has a lifetime of its own, and that doubtless each, in its fullness of time, becomes an abode of intelligent beings.

But, assuming that other worlds in their turn become the abodes of intelligent beings, it may still be asked, how can man

form any proper estimate of his own relative importance as compared with them? For it is admitted that we can estimate the relative importance of anything only by comparison, and hence that, in order to form any adequate conception of man's relative importance in the scale of being, we must compare him with the other intelligences of the universe; and it may be truly said that we have no direct means of thus comparing him with them. The plan of my lecture assumes, however, that although this cannot be done directly, inasmuch as we have no direct means of becoming personally acquainted with the inhabitants of other worlds, yet that it may be done indirectly by comparing his abode with that of theirs.

Before entering upon the formal discussion of this part of my subject, it may be proper to premise that the word cosmos, a term which I shall frequently have occasion to use, is an anglicised Greek word, which literally signifies order, harmony, system, and hence is applicable to any-

thing which comprises all these elements. Technically it is not applied, however, to any system smaller than that of our earth. Hence, assuming that the inhabitants of the universe are somewhat proportionate in their importance to the cosmical systems to which they respectively belong, we shall use the earth as a kind of cosmical unit in estimating man's relative importance in the scale of being. And in order that the comparison may be the more complete, we shall, first, take a mental survey of this world of ours, and then inductively rise, by easy gradations, from the contemplation of individual worlds to that highest generalization in which the sum total of all things appears as but one complete system.

Beginning, then, with our world, we find everything reduced to system. All its masses of unorganized matter assume and retain their form and relative position in virtue of natural forces acting in subordination to a previous plan. All the chemical elements that enter into the

composition of matter unite in definite proportions and according to fixed laws. Every plant belonging to the vegetable kingdom, from the mightiest oak to the infinitesimal forms revealed by the microscope, is in itself a complete organism. And every member of the animal kingdom, from the monsters of the land and sea to the microscopic forms so small that a billion of them can pass at once through a needle's eye, is in itself a complete organism. And all these different kinds of organisms are themselves grouped into systems which are the mutual complements of one another, have a regular order of superposition, and are so harmoniously arranged and nicely adjusted that when we thus examine the earth as to its mechanical laws, its chemical constitution, its manifold forms of vegetable life, and its teeming millions of animal existences, and witness the organic relation of all these systems as parts, their mutual dependencies and adaptations, and the unity of design that everywhere prevails, we

cannot but regard this world of ours, with all its manifoldness and endless variety, as a complete system, a perfect cosmos in itself.

But our world is only one of many similar bodies known as planets which revolve around the sun as their common center, and which, with their satellites, the comets, the meteoric and zodiacal belts, and the sun, constitute the solar system. In order to form an approximate idea of the magnitude of this system it is only necessary to consider that, in addition to the several rings of meteoric bodies already alluded to, it embraces over 200 planets and planetoids, about 20 satellites, and more than 800 comets already discovered; that some of the other planets are much larger than the earth, Jupiter for example, being more than 1,300 times as large; that the sun is nearly 1,300,000 times as large as the earth, and 500 times as large as all the planets, satellites, and comets taken together; that Neptune, the most remote planet in the solar system

yet discovered, is nearly 3,000,000,000 of miles distant, and requires 165 of our years to make its annual revolution, and that a cannon ball traveling from it at the rate of 500 miles an hour, would require nearly 700 years to reach the sun. Now, as the constitution and most of the physical conditions of some of the other planets are similar to those of ours, doubtless they are as replete with life and the varied forms of existence as ours. And inasmuch as some of the others are much larger, constructed on a grander scale, and more highly ornamented than ours, it is fair to suppose that they are destined to possess, in their turn, a greater variety of creatures, and perhaps a higher order of intelligences than ours. And yet, notwithstanding the great number of bodies which revolve round the sun, their immense magnitudes and distances, and the multiplicity and infinite variety of the planetary existences, all, when taken together, form a complete system, which is a perfect cosmos in itself.

But the sun, the center of the solar system, is only one of the stars. And it may be here remarked that the number of stars even in our firmament is truly wonderful; for, although it is computed that only about 6,000 of them are visible to the naked eye, yet by the aid of the telescope over 20,000,000 of them, embracing every variety of size, color, and brilliancy, have been already brought into view. And doubtless each of these stars is the center of a great system to which it imparts heat and light and life and happiness, just as the sun does to the solar system. And as multitudes of the stars are many times as large as the sun, some of them being more than a million times as large, and as doubtless the planets composing their respective systems are proportionally numerous and large, may they not abound in modes of existence and orders of intelligence in comparison with which those of this little world of ours dwindle into insignificance?

If we carry our investigations still further

we find the stars themselves gathered into systems. Thousands of the stars, which, on account of their great distances, appear single to the naked eye, are found, when examined with a telescope, to consist of several glowing suns which, with their retinue of attendant worlds, instead of revolving around some great central sun, as in the case of the sun systems already noticed, simply revolve around their common center of gravity, which in their case is usually a mere point in space, not coinciding with any of them. As these systems, or multiple stars as they are called, are frequently composed of stars of various colors, as white, green, blue, purple, and so on, what a variety and wonderful blending of coloring must be witnessed on the planets which they conjointly illuminate! And yet each of these multiples, with all its complications and endless variety, is a complete system, a perfect cosmos in itself.

On more careful examination, we find the heavens to abound in groups of stars.

And some of these groups that appear to the naked eye, and even in telescopes of moderate size, as mere hazy specks in the sky, not occupying the space of one-fourth the apparent size of the moon, are found, when examined with a stronger glass, to embrace hundreds of brilliant suns, all arranged in beautiful symmetry and surpassing in grandeur ten thousand worlds like ours. And yet each of these groups, with all its glowing suns and attendant worlds, is a complete system, a perfect cosmos in itself. And, when we reflect on the countless numbers of these groups and the myriads of exalted intelligences that may inhabit them, we cannot but regard the inhabitants of this world but "as the drop of a bucket" or "as the small dust of the balance."

Peering still further into the heavens with the aid of a more powerful telescope, we descry in portions of space not occupying one-tenth the apparent size of the moon, beautiful globular clusters of stars, all arranged in perfect harmony, each of

which, although invisible to the naked eye, embraces more than ten thousand bright and glowing suns. And yet each of these myriad clusters, with all its mighty host of suns and worlds and inhabitants, is a complete system, a perfect cosmos in itself.

It is now understood that not only the solar system but all the other star-systems, groups, and clusters that compose our whole starry firmament, embracing not only those visible to the naked eye but also those revealed by the telescope, are organically related and have a common center of gravity and motion, thus constituting one grand system, a perfect cosmos of the highest order yet discovered, and which is sometimes called our universe because it comprises all of creation known to us till very recently. Now, in order to form a faint conception of the vastness of this system, it is only necessary to consider that the nearest star in our firmament is more than 20,000,000,000,000 of miles distant, and that its light

traveling at the rate of 185,000 miles a second, which rate would carry it round the earth more than seven times in a second, is nearly $3\frac{1}{2}$ years in reaching us; while the more remote stars even of our firmament are so far away that their light requires more than 50,000 years, and a cannon ball, traveling from them at the rate of 500 miles an hour, would require more than 3,000,000,000 of years to reach us—a period in comparison with which all the time that has elapsed since man was placed on earth seems as but a fleeting moment!

But our whole starry firmament, with all its apparent magnificence, is but a mere speck in the scheme of nature, a kind of island universe in the infinite ocean of space. Over 5,000 such universes have been already discovered, and doubtless these and ours and myriads of others have a common revolution around some still greater center, and so on, in a constantly ascending scale, till at last the great center of centers is reached, where all motion

originates, and where all forces and laws are resolved into one—thus literally constituting The Universe, and where some devout astronomers have conjectured is the Throne of Nature, for it is written, "The Lord hath prepared his throne in the heavens, and his kingdom ruleth over all."

Now, if in imagination we take our stand on the central plane of the universe, near this great throne of universal empire, around which all the worlds, and suns, and multiples, and groups, and clusters, and firmaments that people space sweep in their matchless grandeur, and there contemplate the various works of God, we are filled with wonder and with awe; and while, enraptured with the music of the spheres, we with sublime emotion stand and gaze on the mighty orbs of brilliant luster and varied hue as they roll on in their glorious course, replete with life, and witness their teeming millions instinct with joy, warbling out their notes of praise to the great Jehovah, we are filled with admiration and delight.

But, leaving these transporting scenes, let us now in imagination wing our way out through the realms of space, till in the very outskirts of creation we behold this benighted world of ours, and when almost within speaking distance, with microscopic view, descry the creature man as a mere atom on its surface, and then, approaching still nearer, observe him strutting and swelling and bidding defiance to all the laws of nature, and even belching out blasphemy against the great Creator, and then reflect that, while the heavens declare the glory of God and the firmament showeth his handiwork, perhaps this is the only world that has been marred by sin, and you will have some faint conception of man's relative importance in the scale of being.

And surely, from this comparison of our earth as a cosmical system with the other cosmical systems of the universe, we find but little to flatter our pride but much to teach us humility. For instead of finding ourselves to be the lords of creation, as we

have been accustomed to style ourselves, it appears that we are but the petty tyrants of this little sublunary sphere which we call the earth. With great propriety then can each of us adopt the language of the Psalmist and say: "When I consider the heavens the work of thy fingers, the moon and the stars which thou hast ordained, Lord, what is man that thou art mindful of him! or the son of man that thou dost visit him!"

Still, we have no reason to despair; for although we belong to a cosmos of the lowest order, and it a rebel province cursed by sin, we find many creatures on it more insignificant than ourselves, and divine revelation assures us that God's watchful providence extends to all his creatures so minutely that not a sparrow falls to the ground without his notice, and that even the very hairs of our heads are numbered. Moreover, we are encouraged to claim, as our Heavenly Father, the same God that created and upholds the universe with all its superior intelligences.

And if not a sparrow falls to the ground without his notice, and if we are of more value than many sparrows, how much more will He take care of us!

Besides, we are distinctly taught in revelation that the earth is not to be our abiding place forever, that this present life is but a state of preparation, and this world but a preparatory school for another far more enduring; that our capacities for future enjoyment will be conditioned by our present action; and that this little creature man, so instinct with immortality, is destined to survive the wreck of time, and if regenerated and saved may bask in the sunshine of God's presence throughout the ceaseless ages of eternal duration!

But, if this be our relation to the present and to the future life, how important is it that we should be up and doing, and improve our present opportunities to the best advantage! For doubtless every state of existence has its own peculiar laws of development and discipline. And if so,

the development and discipline required of us here cannot be secured hereafter, but must be acquired by severe labor subject to all the trials and difficulties peculiar to the present life.

Nor need any one ever be afraid of exhausting the sources of knowledge treasured up even in this world, or of learning too much in any event; for the greatest philosopher scarcely finds out enough to teach him how little he knows. Even Sir Isaac Newton, after having explored all the fields of science to the best of his ability, was led to exclaim, "I have gathered but a few pebbles on the sea-shore of creation!" Besides, when we shall have acquired all the knowledge we can on earth, and thus disciplined all our faculties by the most judicious application, we shall be scarcely qualified, even in an intellectual point of view, to enter the threshold of eternity; for doubtless we have many lessons to learn after we leave this mundane sphere. We have reason to believe, however, that the conditions

of our immortal growth in the future life will be such as to afford us unalloyed pleasure. And, when we pass the bourne of time and stand on the hills of immortality, our mental horizon may be much widened and our field of vision greatly enlarged.

> "Lo! there in contemplation's car
> We may career from star to star;
> And, wondering, view the works of God,
> By angels seen, by angels trod."

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